February 1, 1866.

Lieut.-General SABINE, President, in the Chair.

The following communications were read:—

I. "On the Specific Gravity of Mercury." By BALFOUR STEWART, M.A., LL.D., F.R.S., Superintendent of the Kew Observatory. Received January 25, 1866.

Some time since, in connexion with a research on the fusing-point of mercury, several observations were made at Kew of the specific gravity of this fluid.

A specific-gravity bottle was used for this purpose and it was washed, in the first place with sulphuric acid, secondly with distilled water, and thirdly with alcohol; when this was done it was found to contain mercury without any air-specks or any diminution of that metallic lustre which pure mercury exhibits when in contact with a vessel of clean glass. Three different specimens of pure mercury were used and were separately weighed in the specific-gravity bottle at 62° Fahr. The following results were obtained:—

	Weighed in air. grs.
Mercury from the cistern of the old Kew standard barometer, filling the bottle, weighed at 62° F.	13591·36
Mercury from the cistern of the new Kew standard barometer weighed at 62° F.	13591·66
Mercury used in experiments with air-thermometer weighed at 62° F.	13591·96

the mean of these will be 13591·66 grs.

It was found that the specific-gravity bottle had an internal volume equal very nearly to 4 cubic inches, and assuming that a cubic inch of air weighs 0·31 gr., then the air displaced by the liquid filling the bottle would weigh 1·24 gr.

In like manner the air displaced by the Kew standard weights (sp. gr. 8·2) would have the volume of 6·6 cubic inches, and would weigh 2·04 grs.

From these premises we find that the real weight of the mercury *in vacuo* would have been 13590·86 grs.

Again, the amount of water which the same bottle held at 62° F. weighed in air 1000·53 grs.

Here the air displaced by the bottle is, as before, 1·24 grs., while that displaced by the weights is only 0·15 gr.

From this we find that the real weight of water filling the bottle at 62° F. would be *in vacuo* 1001·62 grs. We have thus—

True weight of mercury filling the bottle at 62° F. = 13590·86 grs.
True weight of the same volume of water at 62° F. = 1001·62 grs.

And hence the specific gravity of mercury at 62° F., as compared with water at the same temperature, will be 13·569 nearly.

Again, if we assume the correctness of Regnault's Table of the absolute dilatation of mercury, and also that of Despretz's Table of the absolute dilatation of water, we shall find that the weight at 32° F. of a volume of mercury weighing 13590·86 grs. at 62° F. will be

$$13590{\cdot}86 \times 1{\cdot}00298 = 13631{\cdot}361 \text{ grs.}$$

Also the volume at 4° C., or 39°·2 F., of a volume of water weighing at 62° F. 1001·62 grs., will be

$$1001{\cdot}62 \times 1{\cdot}0011437 = 1002{\cdot}766 \text{ grs.}$$

Hence the specific gravity of mercury, according to the French method of determining it, will be

$$\frac{13631{\cdot}361}{1002{\cdot}766} = 13{\cdot}594.$$

A determination by Regnault gives 13·596.

These two results agree very nearly with one another; and this agreement tends not only to verify the correctness of Regnault's determination, but to show that Regnault's Table of the dilatation of mercury, and Despretz's Table of the dilatation of water, agree together; a remark that had been previously made by Dr. Matthiessen in a paper which he recently presented to the Society.

II. "On the Forms of Graphitoidal Silicon and Graphitoidal Boron." By W. H. Miller, M.A., For. Sec. R.S., and Professor of Mineralogy in the University of Cambridge. Received February 1, 1866.

Graphitoidal Silicon.

It has been so confidently assumed that graphitoidal silicon is an allotropic condition of silicon crystallized in octahedrons, that on ascertaining by measurement of angles that some graphitoidal silicon given me by Dr. Matthiessen was in simple and twin octahedrons, I at once concluded that the substance had been wrongly named. Later, however, I obtained from Dr. Percy a supply of graphitoidal silicon of unquestionable authenticity. Its lustre was that of the crystals I had previously examined. It occurred in small scales, having for the most part the appearance of crystals of the oblique system. On measurement, however, they proved to be octahedrons in which two parallel faces were much larger than any of the other faces, and two other parallel faces were either too small to be observed or were altogether wanting. One of the scales had all the faces of a twin octahedron. It appears, then, that there is no reason, founded on a difference of form, for separating graphitoidal from octahedral silicon, the sole